Graph theoretical properties of degree six 3-modified chordal ring networks

ABSTRACT

Chordal rings are important models for the development of parallel and distributed interconnection networks. Hence, much research on their variations and properties had been published over the years. In this study, a new type of chordal ring network is presented, the degree six 3-modified chordal ring (CHR6m_3) which is able to accommodate both odd and even numbers of nodes so long as the network size is divisible by 3. The aim of the research was to develop relations for the theoretical diameter and average path length for CHR6m_3 as well as to present the main properties of CHR6m_3. The relations were developed based on data from the tree visualisation of CHR6m_3 while the main properties encompass Hamiltonicity, asymmetry and node colouring. Results for theoretical diameter and average path lengths for their corresponding network sizes were based on the formulae generated. Several theorems regarding the main properties were constructed and proven. Hamiltonian circuits could be constructed on the basis of certain types of chords if certain conditions were met. CHR6m_3 was proven to be asymmetric. A proper node colouring was proposed along with the conditions for its existence. A small chromatic number is important in minimising network process completion times.

Keyword: Asymmentry; Average path length hamiltonicity; Chordal rings; Diameter